In the Claims:

Please cancel claims 30-36 without prejudice. The status of all claims is as follows:

1. (Original) A compensating multi-layer material comprising:

an indefinite anisotropic first layer having material properties of ε_1 and μ_1, both of ε_1 and μ_1 being tensors, and a thickness d_1;

an indefinite anisotropic second layer adjacent to said first layer, said second layer having material properties of ε_2 and μ_2, both of ε_2 and μ_2 being tensors, and having a thickness d_2; and,

wherein ε_1, μ_1, ε_2, and μ_2 are simultaneously diagonalizable in a diagonalizing basis that includes a layer normal to said first and second layers, and

$$\varepsilon_2 = \psi\varepsilon_1$$

$$\mu_2 = \psi\mu_1$$

where

$$\varphi = -\begin{bmatrix} \frac{d_1}{d_2} & 0 & 0 \\ 0 & \frac{d_1}{d_2} & 0 \\ 0 & 0 & \frac{d_2}{d_1} \end{bmatrix}$$

and ϕ is a tensor represented in said diagonalizing basis with a third basis vector that is normal to said first and second layers.

2. (Original) A compensating multi-layer material as defined by claim 1 wherein said first and second layers are generally planar and of equal thickness, X and Y axes being defined along the plane of said generally planar first and second layers and a Z axis defined normal to said generally planar first and second layers, and wherein each of said material properties ε and μ for both of said layers are tensors that may be defined as:

$$\varepsilon_1 = -\varepsilon_2 = \begin{pmatrix} \varepsilon_x & 0 & 0 \\ 0 & \varepsilon_y & 0 \\ 0 & 0 & \varepsilon_z \end{pmatrix}$$

$$\mu_1 = -\mu_2 = \begin{pmatrix} \mu_x & 0 & 0 \\ 0 & \mu_y & 0 \\ 0 & 0 & \mu_z \end{pmatrix}$$

3. (Original) A compensating multi-layer material as defined by claim 2 wherein each of said layers are composed of media with the *Never Cutoff* property for at least one polarization.

4. (Original) A compensating multi-layer material as defined by claim 3 wherein said at least one polarization is y-axis electric polarization, and wherein:

$$\varepsilon_y \; \mu_x > 0$$

$$\frac{\mu_x}{\mu_z} < 0$$

5. (Original) A compensating multi-layer material as defined by claim 2 wherein said first and second layers define a filter operative for at least one polarization to attenuate incident waves that are one of above or below a cutoff value of the transverse wavevector.

6. (Original) A compensating multi-layer material as defined by claim 5 wherein said filter is comprised of cutoff material if said incident waves are above said cutoff value, and wherein said filter is comprised of anti-cutoff material if said incident waves are below said cutoff value.

7. (Original) A compensating multi-layer material as defined by claim 5 wherein said at least one polarization is y-axis polarization, and wherein said cutoff value of the transverse wavevector is expressed as k_c:

$$k_c = k_0 \sqrt{(\varepsilon_y \mu_z)}$$

where

$$k_0 = \frac{2\pi}{\lambda}$$

and λ is the free space wavelength.

8. (Original) A compensating multi-layer material as defined by claim 1 wherein $\varepsilon_1 = \mu_1$, and $\varepsilon_2 = \mu_2$.

9. (Original) A compensating multi-layer material as defined by claim 1 wherein said first and second layers are generally planar and parallel to one another.

10. (Original) A compensating multi-layer material as defined by claim 1 wherein said first and second layers each have a length and a width, said lengths and widths being much larger than said thicknesses d_1 and d_2.

11. (Original) A compensating multi-layer material as defined by claim 1 wherein $d_1 = d_2$.

12. (Original) A compensating multi-layer material as defined by claim 1 wherein each of said layers comprises a composite material including a host dielectric and one of an artificial electric or magnetic medium embedded in said host medium.

13. (Original) A compensating multi-layer material as defined by claim 12 wherein said artificial electric or magnetic medium comprises one or more conductors in a periodically spaced arrangement.

14. (Original) A compensating multi-layer material as defined by claim 12 wherein said artificial electric or magnetic medium comprises one or both of split ring resonators and substantially straight wires in a periodic spatial arrangement.

15. (Original) A compensating multi-layer material as defined by claim 12 wherein said dielectric host comprises one or more members selected from the group consisting of: thermoplastics, ceramics, oxides of metals, and mica.

16. (Original) A compensating multi-layer material as defined by claim 1 wherein said first and second layers define a first layer pair, and wherein the compensating multi-layer material further includes a plurality of additional layer pairs sequentially adjacent to one another to form a continuous series of layer pairs, each of said additional layer pairs comprised of two indefinite anistropic layers that define a compensating structure.

17. (Original) A compensating multi-layer material as defined by claim 16 wherein each of said additional layer pairs are substantially identical to said first and second layers.

18. (Original) A compensating multi-layer material as defined by claim 1 wherein each of said first and second layers have a thickness of less than about 10 wavelengths of an incident wave.

19. (Original) A compensating multi-layer material as defined by claim 1 wherein said first and second layers at least partially define a spatial filter configured to

reflect beams incident to said layers at low angles to the normal and to transmit beams incident at higher angles for at least one polarization.

20. (Original) A compensating multi-layer material as defined by claim 1 wherein said first and second layers are configured to define one of a high-pass or a low-pass spatial filter.

21. (Original) A compensating multi-layer material as defined by claim 1 wherein said first and second layers at least partially define a spatial filter configured to define an upper critical angle above which incident beams from free space will be reflected for at least one polarization.

22. (Original) A multi-layer compensating material as defined by claim 1 wherein said first and second layers define a first pair of compensating bilayers, and further including a second pair of compensating bilayers, said first pair of compensating layers defining a low pass spatial filter and said second pair defining a high pass spatial filter, so that the first and second pair together define a band pass spatial filter configured to transmit incident beams that are in a mid-angle range while reflecting beams that are incident at angles smaller than said mid-angle range and larger than said mid-angle range for at least one polarization.

23. (Original) A compensating multi-layer material as defined by claim 1 wherein one of said first or said second layers defines an input plane and the other an output plane, and wherein said first and second layers are configured to couple electromagnetic distribution from said input plane to said output plane with a unity transverse-wave-vector transfer function that can extend substantially beyond the free space transverse-wave-vector cutoff and into the near field components for at least one polarization

24. (Original) A compensating multi-layer material as defined by claim 1 wherein one of said first or said second layers defines an input plane and the other an output plane, and wherein said first and second layers are configured to couple electromagnetic distribution from said input plane to said output plane with a high-pass, transverse-wave-vector transfer function, and the high-pass roll-off may lie above the free space transverse-wave-vector cutoff for at least one polarization.

25. (Original) A compensating multi-layer material as defined by claim 1 wherein one of said first or said second layers defines an input plane and the other an output plane, and wherein said first and second layers are configured to couple electromagnetic distribution from said input plane to said output plane with a low-pass, transverse-wave-vector transfer function, with a low-pass roll-off being above the free space transverse-wave-vector cutoff for at least one polarization.

26. (Original) An indefinite multi-layer material as defined by claim 1 wherein said first and second layers define an antenna substrate, the antenna further including a radiator proximate to said antenna substrate.

27. (Original) An indefinite material as defined by claim 26, wherein said radiator comprises one of a dipole, patch, phased array, traveling wave or aperture.

28. (Original) A shaped beam antenna including the indefinite multi-layer material defined by claim 1, said shaped beam antenna further including a radiating element embedded therein.

29. (Original) A compensating multi-layer material comprising:

an indefinite anisotropic first layer having material properties of ε_1 and μ_1, both of ε_1 and μ_1 being tensors, and a thickness d_1;

an indefinite anisotropic second layer adjacent to said first layer, said second layer having material properties of ε_2 and μ_2, both of ε_2 and μ_2 being tensors, and having a thickness d_2,

wherein the necessary tensor components for compensation satisfy:

$$\varepsilon_2 = \psi\varepsilon_1$$

$$\mu_2 = \psi\mu_1$$

where

$$\varphi = -\begin{bmatrix} \frac{d_1}{d_2} & 0 & 0 \\ 0 & \frac{d_1}{d_2} & 0 \\ 0 & 0 & \frac{d_2}{d_1} \end{bmatrix}$$

and ψ is a tensor represented in said diagonalizing basis with a third basis vector that is normal to said first and second layers, where the necessary components are:

ε_y, μ_x, μ_z for y-axis electric polarization, ε_x, μ_y, μ_z for x-axis electric polarization, μ_y, ε_x, ε_z, for y-axis magnetic polarization, and μ_x, ε_y, ε_z for x-axis magnetic polarization; and wherein the other tensor components may assume any value including values for free space.

30-36. (Canceled)